The HART (Highway Addressable Remote Transducer) Protocol is the global standard for sending and receiving digital information across standard, twisted-pair instrumentation cables connecting smart field devices and control/monitoring systems. This information can be accessible from a technician's hand-held device or laptop connected to a plant's process control, asset management, safety or other system using any control platform.

The HART network employs a bi-directional communication protocol, operating at 1,200 bits/sec that provides data access between intelligent devices such as Limitorque MX and QX electronic actuators and a distributed control system (DCS) or other monitoring systems. In addition to a digital system, the network simultaneously provides a 4-20 mA analog signal that is proportional to the field unit's primary measured value.

MX multi-turn actuator

QX quarter-turn actuator

Features and Benefits

The following commands and feedback information can be transmitted and received by MX/QX HART unit:

- OPEN, CLOSE and STOP commands
- ESD (emergency shutdown) commands
- Partial stroke test commands
- Go-to-position commands
- Unit output torque (0–100% rating)
- Actuator status, alarm and diagnostic messages
- Burst messages
- Travel histogram
- Event notifications
- LimiGard™ patented signal monitoring
 *(U.S. Patent No. 5,719,559)*
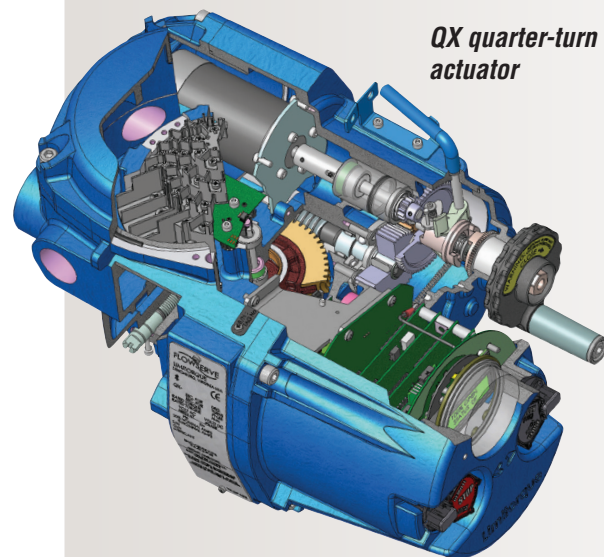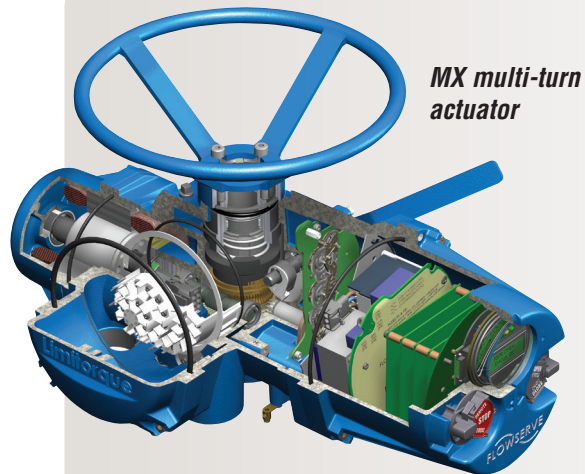
The MX/QX HART field unit interface board is installed in the actuator controls compartment, permitting the actuator to be controlled by a DCS or other network host over the HART network.

HART®
COMMUNICATION PROTOCOL

Experience In Motion

Technical Data

The HART protocol is defined as an open network standard. Limitorque MX and QX electronic actuators are certified for use by the HART Communication Foundation (HCF).

The MX/QX HART field unit uses the HART protocol to communicate over the HART network with other HART-enabled devices. The HART protocol is a master/slave communication service for process control devices. HART digital signaling is an extension of conventional analog signaling, allowing the network signal to ride on the 4-20 mADC process signal. It uses 1,200 bps binary phase-continuous Frequency-Shift-Keying (FSK), where a high-frequency current is superimposed on a low-frequency (typically, 4-20 mADC) analog current.

HART Protocol — Network Topologies

Distributed Control System
(Host)

Control Highway

HART
Interface

Point to Point
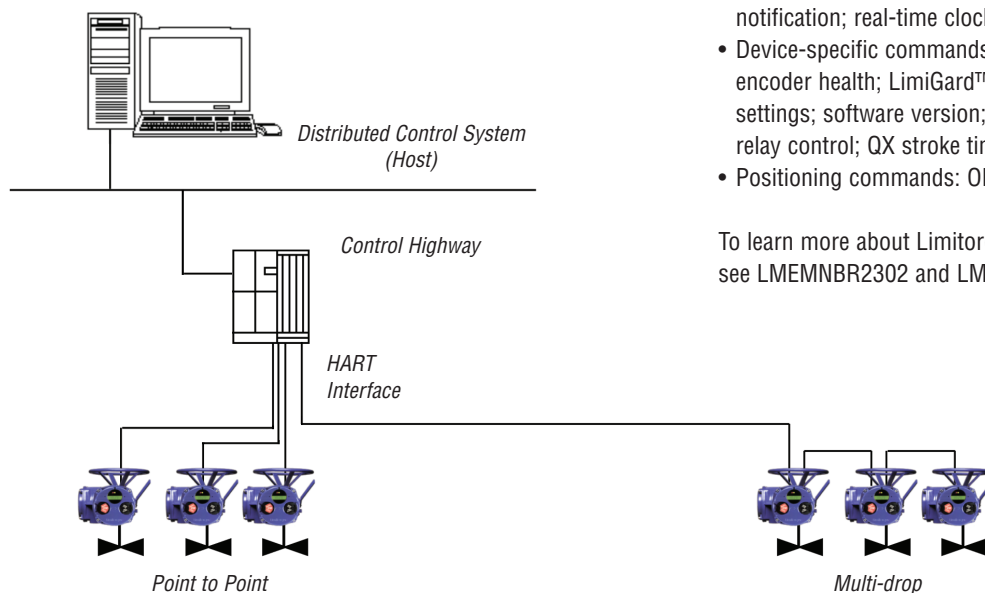
Multi-drop

- Complies with HART Communication Protocol Specification (Document HCF Spec-13) for Revision 7.4
- Point-to-point or multi-drop network topology
- Distances up to 1,800 meters/network (up to 15 devices)
- EDDL (IEC 61804-2, EDDL) with methods for all supported common practice and device-specific commands
- VALVESIGHT DTM for all FDT/DTM-compliant Asset Management Systems
- Device variables: position set point; valve position; torque; compartment/motor temperature
- Universal commands: 0–3, 6–9, 11–22, 38, 48 to read primary variable; loop current; device status, etc.
- Common practice commands: 33, 35–37, 40–42, 45–46, 49–51, 53–54, 56, 59–60, 63, 65–68, 71, 76, 78–79, 89–93, 95, 103–109, 115–119 for calibration; self-test; burst mode; event notification; real-time clock; trending, etc.
- Device-specific commands: partial stroke test; travel histogram; encoder health; LimiGard™; motor controller health; torque settings; software version; network ESD configuration, DO relay control; QX stroke time; operational data, etc.
- Positioning commands: OPEN, CLOSE, STOP; % POSITION

To learn more about Limitorque MX and QX electronic actuators, see LMEMNBR2302 and LMENBR3302, respectively.

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